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Hair treatment compositions

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## HAIR TREATMENT COMPOSITIONS

### FIELD OF THE INVENTION

5

The invention relates to hair treatment compositions. More particularly the invention relates to hair treatment compositions comprising certain specific branched amine and/or hydroxy compounds. The compositions are particularly  
10 suitable for application to hair for repair and restoration of damaged hair.

### BACKGROUND AND PRIOR ART

15 Hair can suffer damage from a number of sources. The hair fibre can be damaged by environmental influences such as exposure to UV and chlorine; chemical influences such as bleaching, perming, overly frequent washing with harsh surfactant-based cleansing shampoo compositions; and  
20 mechanical influences such as prolonged use of heated styling appliances.

Damage to the hair typically manifests itself in cuticle and protein loss from the hair fibre, excessive fibre stiffness,  
25 hair fibre brittleness and breakage and frayed or split ends.

A wide array of ingredients are claimed to be effective in the treatment and prevention of hair damage, as can be seen  
30 from the literature and from marketed products.

Amino acids are commonly used to include protect and repair hair. DE 3118882-A (Noronha RV), describes a tonic for hair which contains a mixture of amino acids. In this mixture, a  
5 1:4:12 histidine:lysine: arginine ratio is said to stimulate keratin formation.

FR 2669224-A (Contier) describes a scalp treatment comprising amino-dicarboxylic acid complexed with a basic  
10 amino acid complex as the active ingredient. The complex is said to prevent degradation of the hair root and improve the hydration of the hair keratin by neutralisation of scalp lactic acid. US 4,201,235 (Mare Corp.) describes hair  
15 treatment with a "cocktail" of 20 different amino acids and vitamins to enhance softness, lustre and body.

Amine oxides have also been used for the repair and protection of hair use is discussed in co-pending application number PCT/EP01/09275.

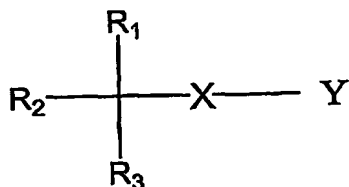
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The present invention have now found that compositions comprising certain specific branched amine and/or hydroxy compounds are effective for repairing and preventing the principal symptoms of damaged hair.

25

#### DESCRIPTION OF THE INVENTION

In a first aspect, the present invention provides a hair  
30 treatment composition comprising a hair repair compound having the following formula:



in which  $R_1$ ,  $R_2$  and  $R_3$  are independently selected from a methyl, ethyl, propyl group or mixtures thereof; X is a substituted or un-substituted alkyl or alkenyl chain and Y is an amine or hydroxy group.

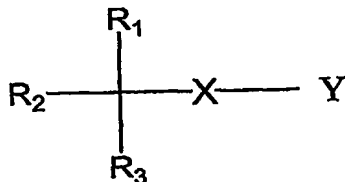
A further aspect of the invention is the use of the above composition for smoothing hair, aligning hair and preventing damage to the hair.

The invention also relates to a method of treating hair by applying the above composition to the hair.

15

#### Hair Repair Compound

The hair repair compound has the general formula:



in which  $R_1$ ,  $R_2$  and  $R_3$  are independently selected from a methyl, ethyl, propyl group or mixtures thereof; X is a substituted or un-substituted alkyl or alkenyl chain and Y is an amine or hydroxy group.

Preferred hair repair compounds comprise at least two hydroxy groups, amino groups or mixtures thereof and have  $n$  as the total number of carbon atoms in the molecule such that each OH or  $\text{NH}_2$  is positioned with  $0.5n$  or less carbon atoms directly between it and all other OH or  $\text{NH}_2$  groups. An example of this would be a molecule having a total of 5 carbon atoms and two hydroxy groups. The hydroxy groups would be 1 or 2 carbon atoms away from each other.

10

It is preferred if X is substituted with an amino or hydroxy group, particularly a hydroxy group. Especially preferred hair repair compounds are diols.

15 It is advantageous if the total number of carbon atoms within the hair repair compound is from 3 to 12.

Preferably  $\text{R}_1$ ,  $\text{R}_2$  and  $\text{R}_3$  of the hair repair compound are all methyl groups.

20

A particularly preferred hair repair compound is according 3,3-dimethyl-1,2-butandiol.

The total amount of the hair repair compound in hair treatment compositions of the invention is generally from 0.001 to 10 wt%, preferably from 0.01 to 5 wt%, more preferably from 0.05 to 2 wt% and yet more preferably from 0.1 to 1 wt%.

30

Product Form

The final product form of hair treatment compositions according to the invention may suitably be, for example, 5 shampoos, conditioners, sprays, mousses, gels, waxes or lotions. Particularly preferred product forms are shampoos, post-wash conditioners (leave-in and rinse-off) and hair treatment products such as hair essences.

10 Shampoo compositions preferably comprise one or more cleansing surfactants which are cosmetically acceptable and suitable for topical application to the hair. Further surfactants may be present as emulsifiers.

15 Suitable cleansing surfactants, are selected from anionic, amphoteric and zwitterionic surfactants, and mixtures thereof. The cleansing surfactant may be the same surfactant as the emulsifier, or may be different.

20 **Anionic Cleansing Surfactant**

Shampoo compositions according to the invention will typically comprise one or more anionic cleansing surfactants which are cosmetically acceptable and suitable for topical 25 application to the hair.

Examples of suitable anionic cleansing surfactants are the alkyl sulphates, alkyl ether sulphates, alkaryl sulphonates, alkanoyl isethionates, alkyl succinates, alkyl sulphosuccinates, N-alkyl sarcosinates, alkyl phosphates, 5 alkyl ether phosphates, alkyl ether carboxylates, and alpha-olefin sulphonates, especially their sodium, magnesium, ammonium and mono-, di- and triethanolamine salts. The alkyl and acyl groups generally contain from 8 to 18 carbon atoms and may be unsaturated. The alkyl ether sulphates, 10 alkyl ether phosphates and alkyl ether carboxylates may contain from 1 to 10 ethylene oxide or propylene oxide units per molecule.

Typical anionic cleansing surfactants for use in shampoo 15 compositions of the invention include sodium oleyl sulphosuccinate, ammonium lauryl sulphosuccinate, ammonium lauryl sulphate, sodium cocoyl isethionate, sodium lauryl isethionate and sodium N-lauryl sarcosinate. The most preferred anionic surfactants are sodium lauryl sulphate, 20 sodium lauryl ether sulphate(n)EO, (where n ranges from 1 to 3), ammonium lauryl sulphate and ammonium lauryl ether sulphate(n)EO, (where n ranges from 1 to 3).



The total amount of anionic cleansing surfactant in shampoo compositions of the invention is generally from 5 to 30, preferably from 6 to 20, more preferably from 8 to 16 wt%.

## 5 Co-surfactant

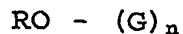
The shampoo composition can optionally include co-surfactants, preferably an amphoteric or zwitterionic surfactant, which can be included in an amount ranging from 0  
10 to about 8, preferably from 1 to 4 wt%.

Examples of amphoteric and zwitterionic surfactants include, alkyl betaines, alkyl amidopropyl betaines, alkyl sulphobetaines (sultaines), alkyl glycinate, alkyl  
15 carboxyglycinates, alkyl amphopropionates, alkylamphoglycinates, alkyl amidopropyl hydroxysultaines, acyl taurates and acyl glutamates, wherein the alkyl and acyl groups have from 8 to 19 carbon atoms. Typical amphoteric and zwitterionic surfactants for use in shampoos of the  
20 invention include lauryl amine oxide, cocodimethyl sulphopropyl betaine and preferably lauryl betaine, cocamidopropyl betaine and sodium cocamphopropionate.

Another preferred co-surfactant is a nonionic surfactant, which can be included in an amount ranging from 0 to 8, preferably from 2 to 5 wt%.

- 5 For example, representative nonionic surfactants that can be included in shampoo compositions of the invention include condensation products of aliphatic ( $C_8 - C_{18}$ ) primary or secondary linear or branched chain alcohols or phenols with alkylene oxides, usually ethylene oxide and generally having  
10 from 6 to 30 ethylene oxide groups.

Further nonionic surfactants which can be included in shampoo compositions of the invention are the alkyl polyglycosides (APGs). Typically, the APG is one which comprises an alkyl  
15 group connected (optionally via a bridging group) to a block of one or more glycosyl groups. Preferred APGs are defined by the following formula:



20

wherein R is a branched or straight chain  $C_5$  to  $C_{20}$  alkyl or alkenyl group, G is a saccharide group and n is from 1 to 10.

Other sugar-derived nonionic surfactants which can be included in shampoo compositions of the invention include the  $C_{10}$ - $C_{18}$  N-alkyl ( $C_1$ - $C_6$ ) polyhydroxy fatty acid amides, such as the  $C_{12}$ - $C_{18}$  N-methyl glucamides, as described for example in WO 92 06154 and US 5 194 639, and the N-alkoxy polyhydroxy fatty acid amides, such as  $C_{10}$ - $C_{18}$  N-(3-methoxypropyl) glucamide.

The shampoo composition can also optionally include one or more cationic co-surfactants included in an amount ranging from 0.01 to 10, more preferably from 0.05 to 5, most preferably from 0.05 to 2 wt%. Useful cationic surfactants are described hereinbelow in relation to conditioner compositions.

The total amount of surfactant (including any co-surfactant, and/or any emulsifier) in shampoo compositions of the invention is generally from 5 to 50, preferably from 5 to 30, more preferably from 10 to 25 wt%.

### Cationic Polymer

A cationic polymer is a preferred ingredient in shampoo  
5 compositions of the invention, for enhancing conditioning  
performance of the shampoo.

The cationic polymer may be a homopolymer or be formed from  
two or more types of monomers. The molecular weight of the  
polymer will generally be between 5 000 and 10 000 000,  
typically at least 10 000 and preferably in the range 100 000  
to about 2 000 000. The polymers will have cationic nitrogen  
containing groups such as quaternary ammonium or protonated  
amino groups, or a mixture thereof.

Suitable cationic nitrogen polymers are described in the CTFA  
Cosmetic Ingredient Directory, 3rd edition

The cationic conditioning polymers can comprise mixtures of  
monomer units derived from amine- and/or quaternary  
ammonium-substituted monomer and/or compatible spacer  
monomers.

Suitable cationic conditioning polymers include, copolymers of 1-vinyl-2-pyrrolidine and 1-vinyl-3-methylimidazolium salt (CTFA name Polyquaternium-16); copolymers of 1-vinyl-2-pyrrolidine and dimethylaminoethyl methacrylate, (CTFA name Polyquaternium-11); cationic diallyl quaternary ammonium-containing polymers in particular (CTFA Polyquaternium 6 and Polyquaternium 7, mineral acid salts of amino-alkyl esters of homo- and copolymers of unsaturated carboxylic acids as described in U.S. Patent 4,009,256; cationic polyacrylamides (as described in WO95/22311).

Cationic polysaccharide polymers suitable for use in compositions of the invention include those with an anhydroglucose residual group, such as a starch or cellulose. Cationic cellulose is available from Amerchol Corp. (Edison, NJ, USA) in their Polymer JR (trade mark) and LR (trade mark) series of polymers, as salts of hydroxyethyl cellulose reacted with trimethyl ammonium substituted epoxide, referred to in the industry (CTFA) as Polyquaternium 10. Another type of cationic cellulose includes the polymeric quaternary ammonium salts of hydroxyethyl cellulose reacted with lauryl dimethyl

- 12 -

ammonium-substituted epoxide, referred to in the industry (CTFA) as Polyquaternium 24. These materials are available from Amerchol Corp. (Edison, NJ, USA) under the tradename Polymer LM-200.

Other suitable cationic polysaccharide polymers include quaternary nitrogen-containing cellulose ethers (e.g. as described in U.S. Patent 3,962,418), and copolymers of etherified cellulose and starch (e.g. as described in U.S. Patent 3,958,581).

A particularly suitable type of cationic polysaccharide polymer that can be used is a cationic guar gum derivative, such as guar hydroxypropyltrimonium chloride (commercially available from Rhone-Poulenc in their JAGUAR trademark series). Particularly preferred cationic polymers are JAGUAR C13S, JAGUAR C14, JAGUAR C15, JAGUAR C17 and JAGUAR C16 Jaguar CHT and JAGUAR C162.

The cationic conditioning polymer will generally be present in compositions of the invention at levels of from 0.01 to 5, preferably from 0.05 to 1, more preferably from 0.08 to 0.5

5 wt%.

Conditioning Surfactant

Conditioner compositions usually comprise one or more  
5 conditioning surfactants which are cosmetically acceptable  
and suitable for topical application to the hair.

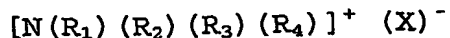
Suitable conditioning surfactants are selected from cationic  
surfactants, used singly or in admixture.

10

Cationic surfactants useful in compositions of the invention  
contain amino or quaternary ammonium hydrophilic moieties  
which are positively charged when dissolved in the aqueous  
composition of the present invention.

15

Examples of suitable cationic surfactants are those  
corresponding to the general formula:



20

in which  $R_1$ ,  $R_2$ ,  $R_3$ , and  $R_4$  are independently selected from (a)  
an aliphatic group of from 1 to 22 carbon atoms, or (b) an  
aromatic, alkoxy, polyoxyalkylene, alkylamido, hydroxyalkyl,

aryl or alkylaryl group having up to 22 carbon atoms; and X is a salt-forming anion such as those selected from halogen, (e.g. chloride, bromide), acetate, citrate, lactate, glycolate, phosphate nitrate, sulphate, and alkylsulphate radicals.

The aliphatic groups can contain, in addition to carbon and hydrogen atoms, ether linkages, and other groups such as amino groups. The longer chain aliphatic groups, e.g., those of about 12 carbons, or higher, can be saturated or unsaturated.

The most preferred cationic surfactants for conditioner compositions of the present invention are monoalkyl quaternary ammonium compounds in which the alkyl chain length is C16 to C22.

Examples of suitable cationic surfactants include quaternary ammonium compounds, particularly trimethyl quaternary compounds.

Preferred quaternary ammonium compounds include cetyltrimethylammonium chloride, behenyltrimethylammonium



chloride (BTAC), cetylpyridinium chloride,  
tetramethylammonium chloride, tetraethylammonium chloride,  
octyltrimethylammonium chloride, dodecyltrimethylammonium  
chloride, hexadecyltrimethylammonium chloride,  
5 octyldimethylbenzylammonium chloride,  
decyldimethylbenzylammonium chloride,  
stearyldimethylbenzylammonium chloride,  
didodecyldimethylammonium chloride,  
dioctadecyldimethylammonium chloride, tallowtrimethylammonium  
10 chloride, cocotrimethylammonium chloride, PEG-2 oleylammonium  
chloride and salts of these where the chloride is replaced  
by halogen, (e.g. , bromide), acetate, citrate, lactate,  
glycolate, phosphate nitrate, sulphate, or alkylsulphate.  
Further suitable cationic surfactants include those materials  
15 having the CTFA designations Quaternium-5, Quaternium-31 and  
Quaternium-18. Mixtures of any of the foregoing materials  
may also be suitable. A particularly useful cationic  
surfactant for use in hair conditioners of the invention is  
cetyltrimethylammonium chloride, available commercially, for  
20 example as GENAMIN CTAC, ex Hoechst Celanese.

Salts of primary, secondary, and tertiary fatty amines are  
also suitable cationic surfactants. The alkyl groups of such

amines preferably have from 12 to 22 carbon atoms, and can be substituted or unsubstituted.

Particularly useful are amido substituted tertiary fatty  
5 amines, in particular tertiary amines having one C<sub>12</sub> to C<sub>22</sub>  
alkyl or lakenyl chain. Such amines, useful herein, include  
stearamidopropyldimethylamine,  
stearamidopropyldiethylamine, stearamidoethyldiethylamine,  
stearamidoethyldimethylamine, palmitamidopropyl  
10 imethylamine, palmitamidopropyldiethylamine,  
palmitamidoethyldiethylamine, palmitamidoethyldimethylamine,  
behenamidopropyldimethylamine,  
behenamidopropyldiethylamine, behenamidoethyldiethylamine,  
behenamidoethyldimethylamine,  
15 arachidamidopropyldimethylamine, arachid  
amidopropyldiethylamine, arachidamidoethyldiethylamine,  
arachidamidoethyldimethylamine, diethylaminoethylstearamide.  
Also useful are  
dimethylstearamine, dimethylsoyamine, soyamine,  
20 myristylamine, tridecylamine, ethylstearylamine, N-  
tallowpropane diamine, ethoxylated (with 5 moles of ethylene  
oxide) stearylamine, dihydroxyethylstearylamine, and  
arachidyl behenylamine.

These amines are typically used in combination with an acid to provide the cationic species. The preferred acid useful herein includes L- glutamic acid, lactic acid, hydrochloric acid, malic acid, succinic acid, acetic acid, fumaric acid, tartaric acid, citric acid, L-glutamic hydrochloride, and mixtures thereof; more preferably L-glutamic acid, lactic acid, citric acid. Cationic amine surfactants included among those useful in the present invention are disclosed in U.S. Patent 4,275,055 to Nachtigal, et al., issued June 23, 1981.

10

The molar ratio of protonatable amines to  $H^+$  from the acid is preferably from about 1:0.3 to 1:1.2, and more preferably from about 1:0.5 to about 1:1.1.

15

In the conditioners of the invention, the level of cationic surfactant is preferably from 0.01 to 10, more preferably 0.05 to 5, most preferably 0.1 to 2 wt% of the total composition.

20

The cationic surfactants detailed in this section are also suitable for use in the aspect of the invention wherein a cationic surfactant is intimately mixed with the

thermotropic mesogenic material and with oily conditioning material prior to the incorporation of the conditioning material into the final hair conditioning composition

5 Fatty Materials

Conditioner compositions of the invention preferably additionally comprise fatty materials. The combined use of fatty materials and cationic surfactants in conditioning  
10 compositions is believed to be especially advantageous, because this leads to the formation of a structured phase, in which the cationic surfactant is dispersed.

By "fatty material" is meant a fatty alcohol, an alkoxyated  
15 fatty alcohol, a fatty acid or a mixture thereof.

Preferably, the alkyl chain of the fatty material is fully saturated.

20 Representative fatty materials comprise from 8 to 22 carbon atoms, more preferably 16 to 22. Examples of suitable fatty alcohols include cetyl alcohol, stearyl alcohol and mixtures thereof. The use of these materials is also advantageous in

that they contribute to the overall conditioning properties of compositions of the invention.

Alkoxylated, (e.g. ethoxylated or propoxylated) fatty  
5 alcohols having from about 12 to about 18 carbon atoms in  
the alkyl chain can be used in place of, or in addition to,  
the fatty alcohols themselves. Suitable examples include  
ethylene glycol cetyl ether, polyoxyethylene (2) stearyl  
ether, polyoxyethylene (4) cetyl ether, and mixtures  
10 thereof.

The level of fatty alcohol material in conditioners of the  
invention is suitably from 0.01 to 15, preferably from 0.1 to  
10, and more preferably from 0.1 to 5 wt%. The weight ratio  
15 of cationic surfactant to fatty alcohol is suitably from 10:1  
to 1:10, preferably from 4:1 to 1:8, optimally from 1:1 to  
1:7, for example 1:3.

## OPTIONAL INGREDIENTS

### Suspending Agents

5

In a preferred embodiment, the hair treatment composition, especially if it is a shampoo composition, further comprises from 0.1 to 5 wt% of a suspending agent. Suitable suspending agents are selected from polyacrylic acids, cross-linked  
10 polymers of acrylic acid, copolymers of acrylic acid with a hydrophobic monomer, copolymers of carboxylic acid-containing monomers and acrylic esters, cross-linked copolymers of acrylic acid and acrylate esters, heteropolysaccharide gums and crystalline long chain acyl derivatives. The long chain  
15 acyl derivative is desirably selected from ethylene glycol stearate, alkanolamides of fatty acids having from 16 to 22 carbon atoms and mixtures thereof. Ethylene glycol distearate and polyethylene glycol 3 distearate are preferred long chain acyl derivatives. Polyacrylic acid is available  
20 commercially as Carbopol 420, Carbopol 488 or Carbopol 493. Polymers of acrylic acid cross-linked with a polyfunctional agent may also be used, they are available commercially as Carbopol 910, Carbopol 934, Carbopol 941 and Carbopol 980. An example of a suitable copolymer of a carboxylic acid  
25 containing a monomer and acrylic acid esters is Carbopol 1342. All Carbopol (trade mark) materials are available from Goodrich.

Suitable cross-linked polymers of acrylic acid and acrylate esters are Pemulen TR1 or Pemulen TR2. A suitable heteropolysaccharide gum is xanthan gum, for example that available as Kelzan mu.

5

#### Conditioning Agents

#### Silicone Conditioning Agents

The compositions of the invention can contain, emulsified  
10 droplets of a silicone conditioning agent, for enhancing conditioning performance.

Suitable silicones include polydiorganosiloxanes, in particular polydimethylsiloxanes which have the CTFA  
15 designation dimethicone. Also suitable for use compositions of the invention (particularly shampoos and conditioners) are polydimethyl siloxanes having hydroxyl end groups, which have the CTFA designation dimethiconol. Also suitable for use in compositions of the invention are silicone gums  
20 having a slight degree of cross-linking, as are described for example in WO 96/31188.

The viscosity of the emulsified silicone itself (not the emulsion or the final hair conditioning composition) is typically at least 10,000 cst at 25 °C the viscosity of the silicone itself is preferably at least 60,000 cst, most  
5 preferably at least 500,000 cst, ideally at least 1,000,000 cst. Preferably the viscosity does not exceed  $10^9$  cst for ease of formulation.

Emulsified silicones for use in the shampoo compositions of  
10 the invention will typically have an average silicone droplet size in the composition of less than 30, preferably less than 20, more preferably less than 10  $\mu\text{m}$ , ideally from 0.01 to 1  $\mu\text{m}$ . Silicone emulsions having an average silicone droplet size of  $\leq 0.15 \mu\text{m}$  are generally termed  
15 microemulsions.

Examples of suitable pre-formed emulsions include emulsions DC2-1766, DC2-1784, DC-1785 DC-1786 and microemulsions DC2-1865 and DC2-1870, all available from Dow Corning. These  
20 are all emulsions/microemulsions of dimethiconol. Cross-linked silicone gums are also available in a pre-emulsified form, which is advantageous for ease of formulation. A preferred example is the material available from Dow Corning



as DC X2-1787, which is an emulsion of cross-linked dimethiconol gum. A further preferred example is the material available from Dow Corning as DC X2-1391, which is a microemulsion of cross-linked dimethiconol gum.

5

A further preferred class of silicones for inclusion in shampoos and conditioners of the invention are amino functional silicones. By "amino functional silicone" is meant a silicone containing at least one primary, secondary  
10 or tertiary amine group, or a quaternary ammonium group. Examples of suitable amino functional silicones include: polysiloxanes having the CTFA designation "amodimethicone", Specific examples of amino functional silicones suitable for use in the invention are the aminosilicone oils DC2-8220,  
15 DC2-8166, DC2-8466, and DC2-8950-114 (all ex Dow Corning), and GE 1149-75, (ex General Electric Silicones). Suitable quaternary silicone polymers are described in EP-A-0 530 974. A preferred quaternary silicone polymer is K3474, ex Goldschmidt.

20

Also suitable are emulsions of amino functional silicone oils with non ionic and/or cationic surfactant.

Pre-formed emulsions of amino functional silicone are also available from suppliers of silicone oils such as Dow Corning and General Electric. Specific examples include DC929 Cationic Emulsion, DC939 Cationic Emulsion, and the  
5 non-ionic emulsions DC2-7224, DC2-8467, DC2-8177 and DC2-8154 (all ex Dow Corning).

With some shampoos it is particularly preferred to use a combination of amino and non amino functional silicones

10

The total amount of silicone is preferably from 0.01 to 10 %wt of the total composition more preferably from 0.3 to 5, most preferably 0.5 to 3 wt% is a suitable level.

15 (ii) Non-silicone Oily Conditioning Components

Compositions according to the present invention may also comprise a dispersed, non-volatile, water-insoluble oily conditioning agent.

20

By "insoluble" is meant that the material is not soluble in water (distilled or equivalent) at a concentration of 0.1% (w/w), at 25°C.

Suitable oily or fatty materials are selected from hydrocarbon oils, fatty esters and mixtures thereof.

5     Straight chain hydrocarbon oils will preferably contain from about 12 to about 30 carbon atoms. Also suitable are polymeric hydrocarbons of alkenyl monomers, such as  $C_2-C_6$  alkenyl monomers.

Specific examples of suitable hydrocarbon oils include  
10     paraffin oil, mineral oil, saturated and unsaturated dodecane, saturated and unsaturated tridecane, saturated and unsaturated tetradecane, saturated and unsaturated pentadecane, saturated and unsaturated hexadecane, and mixtures thereof. Branched-chain isomers of these  
15     compounds, as well as of higher chain length hydrocarbons, can also be used.

Suitable fatty esters are characterised by having at least 10 carbon atoms, and include esters with hydrocarbyl chains  
20     derived from fatty acids or alcohols, Monocarboxylic acid esters include esters of alcohols and/or acids of the formula  $R'COOR$  in which  $R'$  and  $R$  independently denote alkyl or alkenyl radicals and the sum of carbon atoms in  $R'$  and  $R$

is at least 10, preferably at least 20. Di- and trialkyl and alkenyl esters of carboxylic acids can also be used.

Particularly preferred fatty esters are mono-, di- and  
5 triglycerides, more specifically the mono-, di-, and tri-  
esters of glycerol and long chain carboxylic acids such as  
C<sub>1</sub>-C<sub>22</sub> carboxylic acids. Preferred materials include cocoa  
butter, palm stearin, sunflower oil, soyabean oil and  
coconut oil.

10

The oily or fatty material is suitably present at a level of  
from 0.05 to 10, preferably from 0.2 to 5, more preferably  
from about 0.5 to 3 wt%.

15 In hair treatment compositions containing a conditioning  
agent, it is preferred that a cationic polymer also be  
present.

#### Adjuvants

20

The compositions of the present invention may also contain  
adjuvants suitable for hair care. Generally such

ingredients are included individually at a level of up to 2, preferably up to 1 wt% of the total composition.

Suitable hair care adjuvants, include amino acids, sugars  
5 and ceramides.

The invention will now be further illustrated by the following, non-limiting Examples.

- 10 Examples of the invention are illustrated by a number, Comparative Examples are illustrated by a letter.  
All percentages quoted are by weight based on total weight unless otherwise stated.

EXAMPLESExample 1

5

The following base shampoo compositions were prepared:

	Examples			
	A	B	1	2
Sodium lauryl ether sulphate (2EO)	12	12	12	12
Cocoamidopropyl betaine	2	2	2	2
Water	to 100	to 100	To 100	to 100

- 10 To these base solutions 0.03M of the following compounds were added:

Compound B is 2-methyl-2,4 pentanediol

Compound 1 is 3,3-dimethylbutan-1-ol

Compound 2 is 3,3-dimethyl-1,2-butanediol.

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The compositions were tested in a cuticle abrasion test.

Root end hair (as received from the supplier) was pre-cleaned by washing for 1 minute in Composition I followed by copious rinsing in double deionised water. The hair was left to dry

- 20 naturally over 24 hrs.

For each test, 4 g of hair was washed in 0.4 g of the test composition for 30 seconds, rinsed for 30 seconds, and the

washing/rinsing cycle repeated. The hair was left to dry naturally overnight.

The hair was cut into 1 cm lengths, placed in a blender bucket and 200 ml of double de-ionised water was added. The blender was placed on full power for 1 minute. The liquor was decanted off and transferred to a 50 ml centrifuge tube and centrifuged for 10 minutes at 4,300 RPM. The resulting clear liquor was decanted off leaving the cuticle sediment at the bottom of the tube.

The cuticle was transferred from the tube into a beaker with 3 x 5 ml washes and passed through a series of sieves (425 and 53 microns). The sieves were washed with a further 2 x 10 ml of water to ensure complete recovery of the cuticle. The sample was made up to 50 ml in a centrifuge tube, centrifuged for 15 minutes and the liquor decanted off. The cuticle was transferred with double deionised water (2 x 10 ml washes) to a beaker and freeze-dried.

The freeze-dried cuticle was weighed back to determine percentage recovery.

The results were as follows:

	Example			
	A	B	1	2
% recovery	0.50	0.50	0.31	0.27

In conclusion, Compositions 1 and 2 perform better than comparative Examples A and B.

Example 3

5

The following shampoo composition was prepared:

	Composition 3 (wt%)
Sodium lauryl ether sulphate (2EO)	12.0
Cocoamidopropyl betaine	2.1
Dimethiconol emulsion	1.5
Jaguar C13S	0.3
Compound 2	0.2
Other ingredients	3.2
Aqua	to 100

The dimethiconol emulsion was DC2-1784 Dow Corning

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Jaguar C13s is Guar hydroxypropyl trimonium chloride.



Example 4

The following conditioner was prepared:

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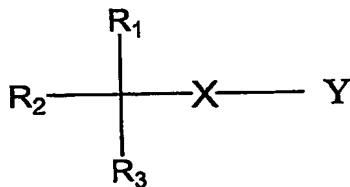
Ingredient	Trade name	Supplier	%w/w
Deionised water			q.s. to 100
Compound 2,			0.5
Behenyl trimethyl ammonium chloride	Genamin KDM-P	Clairant	1
Behenyl alcohol			5
Silicone emulsion	DC2-1784	Dow Corning	2
Disodium EDTA			0.1
Methyl paraben	Nipagin	Nipa Lab	0.2
Perfume			0.5

Compound 2 as for Example 3.

CLAIMS

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1. A hair treatment composition comprising a molecule having the following formula:



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in which  $R_1$ ,  $R_2$  and  $R_3$  are independently selected from a methyl, ethyl, propyl group or mixtures thereof; X is a substituted or un-substituted alkyl or alkenyl chain and Y is an amine or hydroxy group.

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2. A hair treatment composition according to claim 1 in which X is substituted with an amino or hydroxy group.

3. A hair treatment composition according to any preceding claim in which the total number of carbon atoms in the molecule is from 3 to 12.

20

4. A hair treatment composition according to any preceding claim in which the molecule comprises at least two hydroxy groups, amino groups or mixtures thereof and where n is the total number of carbon atoms in the molecule such that each OH or  $NH_2$  is positioned with

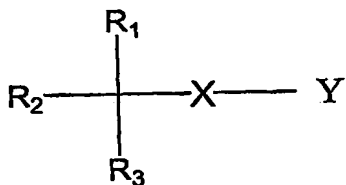
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0.5n or less carbon atoms directly between it and all other OH or NH<sub>2</sub> groups.

5. A hair treatment composition according to any preceding  
5 claim in which R<sub>1</sub>, R<sub>2</sub> and R<sub>3</sub> are all methyl groups.
6. A hair treatment composition according to any preceding  
claim in which the molecule is a diol.
- 10 7. A hair treatment composition according to any preceding  
claim in which the molecule is 3,3-dimethyl-1,2-  
butandiol.
8. A hair treatment composition according to any preceding  
15 claim further comprising a surfactant.
9. A hair treatment composition according to any preceding  
claim which comprises an aqueous base.
- 20 10. Use of a composition according to any preceding claim  
for smoothing hair.
11. Use of a composition according to any one of claims 1  
to 9 for aligning hair.
- 25 12. Use of a composition according to any one of claims 1  
to 9 for preventing damage to the hair.
13. A method of treating hair by applying a composition  
30 according to any one of claims 1 to 9 to the hair.

ABSTRACT

The invention provides a hair treatment composition such as  
5 a shampoo or conditioner suitable for topical application to  
hair for the repair and prevention of damage, comprising a  
molecule having the following formula:



10

in which  $R_1$ ,  $R_2$  and  $R_3$  are independently selected from a  
methyl, ethyl, propyl group or mixtures thereof; X is a  
substituted or un-substituted alkyl or alkenyl chain and Y  
15 is an amine or hydroxy group.

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